HERBAGREEN ®

The soft Revolution
in Agriculture

HERBAGREEN ®

The challenge of our time – bigger and better crops!

In today's world it is estimated that 1 billion people are going to bed hungry. The population is growing and with it the demand for sufficient supply of food.

Within the next four decades the population of the world will rise by about 30% and the demand for agricultural products is estimated to rise by 70%. Agricultural land is limited, deforestation has to stop and there is a competition developing for the use of crops for food or biofuels.

The use of more chemical fertilizers and pesticides is certainly not a solution and water supplies are becoming more and more limited. The challenge remains to find more efficient and environmentally friendly measures to address these problems.

One possibility to increase crops in an environmentally safe way are foliar nutrients like HERBAGREEN®

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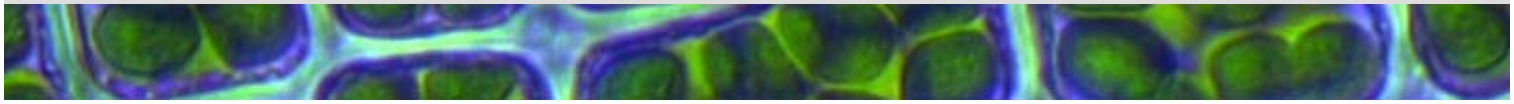
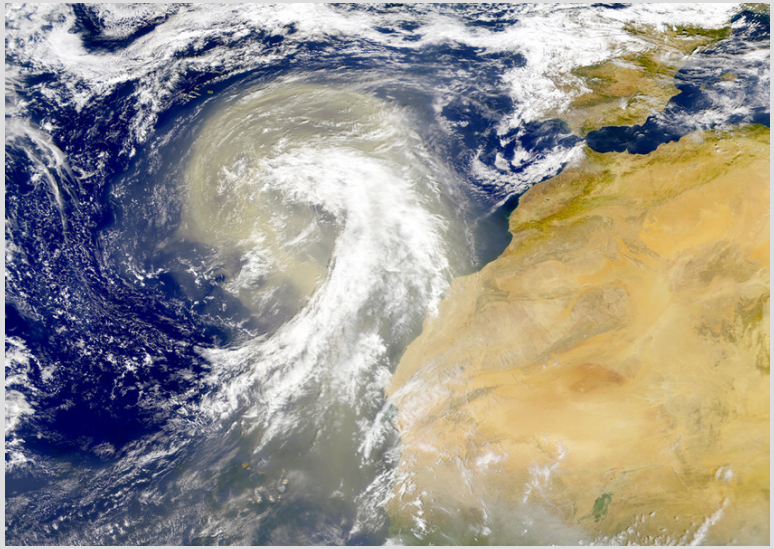
Foliar nutrients, like HERBAGREEN®, are by far the most effective way to provide the plants with nutrients and trace elements. The nutrients are immediately available and easily used by the plants. Investigations by the University of Michigan showed that the up-take of nutrients through the leaves is about 10 to 100 times faster than through the roots. Nutrient imbalances can be quickly corrected by stimulating root up-take of macro nutrients. Foliar nutrients correct deficiencies, strengthen weak or damaged crops and accelerate the growth of strong plants.



HERBAGREEN ®

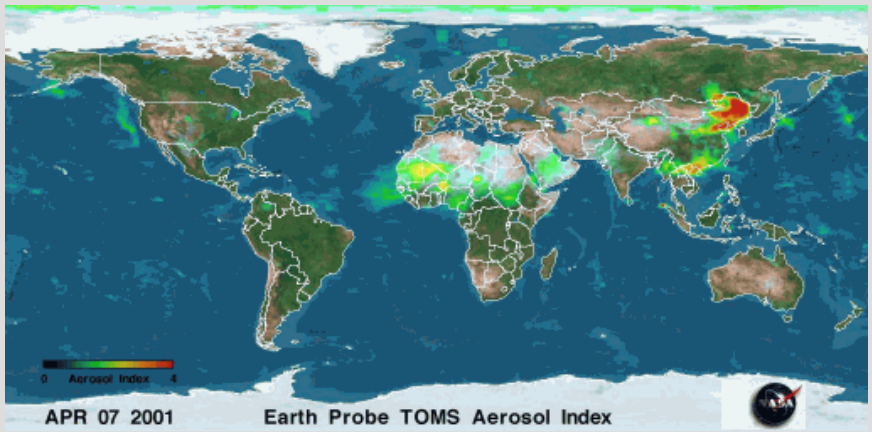
(the HERBAGREEN ® concept in nature)



Every year nature is producing many sandstorms in the deserts and is transporting this dust up into the athmosphere. On the way up, the sand particles are micronised to nanosize. At the same time they are electrically charged.

HERBAGREEN ®

(the HERBAGREEN ® concept in nature)



These particles are moving along the equator driven by centrifugal forces and combine with water-molecules resulting in the activated rain . In areas where it frequently rains , we find the jungle regions of the earth. One exception represent the mammout-trees in California. They receive dust from the great plains of the USA (tornados) and dust from the Gobi desert (China).

HERBAGREEN ®

CHEMICAL AND PHYSICAL ANALYSIS OF *HERBAGREEN ®*

1. Qualitative and quantitative composition

HERBAGREEN ® is made from natural calcite.
Calcite is a sedimentary rock which emerges from calcareous seaweed and is mined in many areas in the world. Calcite consists of calcium carbonate, silica, magnesium and trace elements.
Main components:

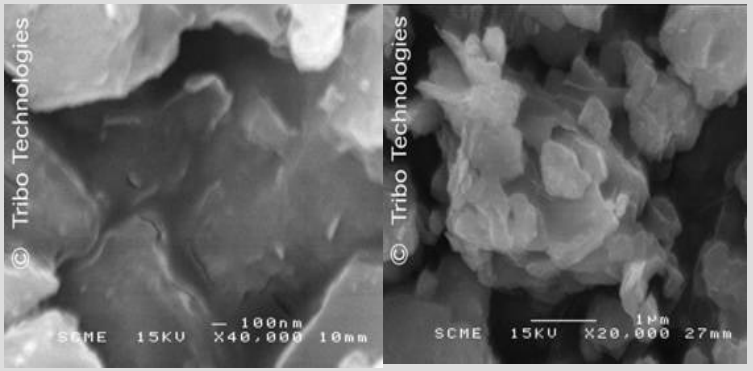
- **$CaCO_3$** (carbonate calcium) : 82.3 %
- **SiO_2** (silicium dioxide) : 8.56%
- **MgO** (magnesium oxide) : 3.02%
- **CaO** (calcium oxide) : 41.7%
- Iron: 8783 mg/kg
- Mn (manganese) : 156 mg/kg
- Selenium: 0.24 mg/kg

Carbonic solubility: 65

Neutralizing value: 47

2. Granularity

HERBAGREEN has a granularity in the region of the micron.

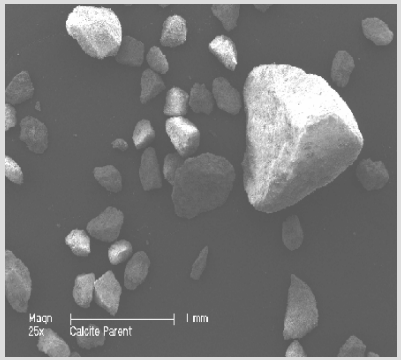


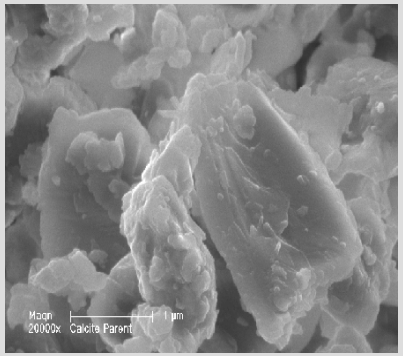
Pictures taken by transmission electronic microscope at CIRAD
The mineral surface has a fragmented structure with an increased exchange surface.

HERBAGREEN ® - *particle size*

Parent calcite

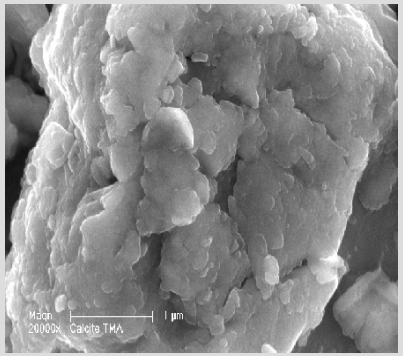
The sample consists of a variety forms and sizes. The dimensions range between **0.1** and 1.5 **mm** (picture left). The surface of these particles is irregular. They are covered by small particles (less than 10 μm) without any particular geometric form.





HERBAGREEN **calcite**

The sample consists of particles with a size between **25 μm** and less than **1 μm** (picture left). The bigger magnification shows the structure of the particles.



HERBAGREEN - *mode of action*

HERBAGREEN ® is a foliar plant nutrient made of calcite, micronized and electrically charged in the patented tribomechanical technology. The result are very reactive micro particles which are dispersed in water and sprayed on to the leaves of plants.

In the leaves and in the presence of water the (CaMg)CO3 particles are progressively split into CO2 (carbon dioxide), CaO (calcium oxide) and MgO (magnesium oxide).

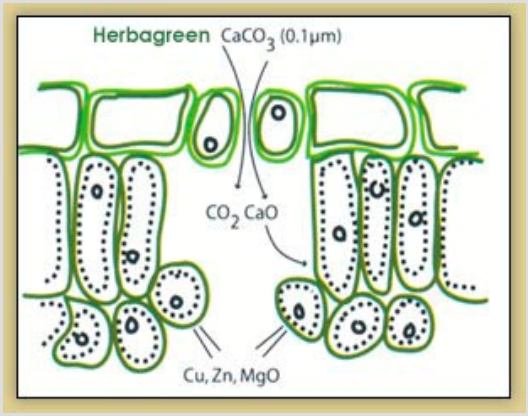
(CaMg)CO3 → (CaMg)O + CO2

CO2 boosts the photosynthesis in the chloroplasts.
Thanks to the CaO the chloroplasts are well formed and bigger resulting in a better functioning photosynthesis. MgO is essential for the formation of chlorophyll.

Migration of starch and polyphenols to the fruits is better and starts earlier.

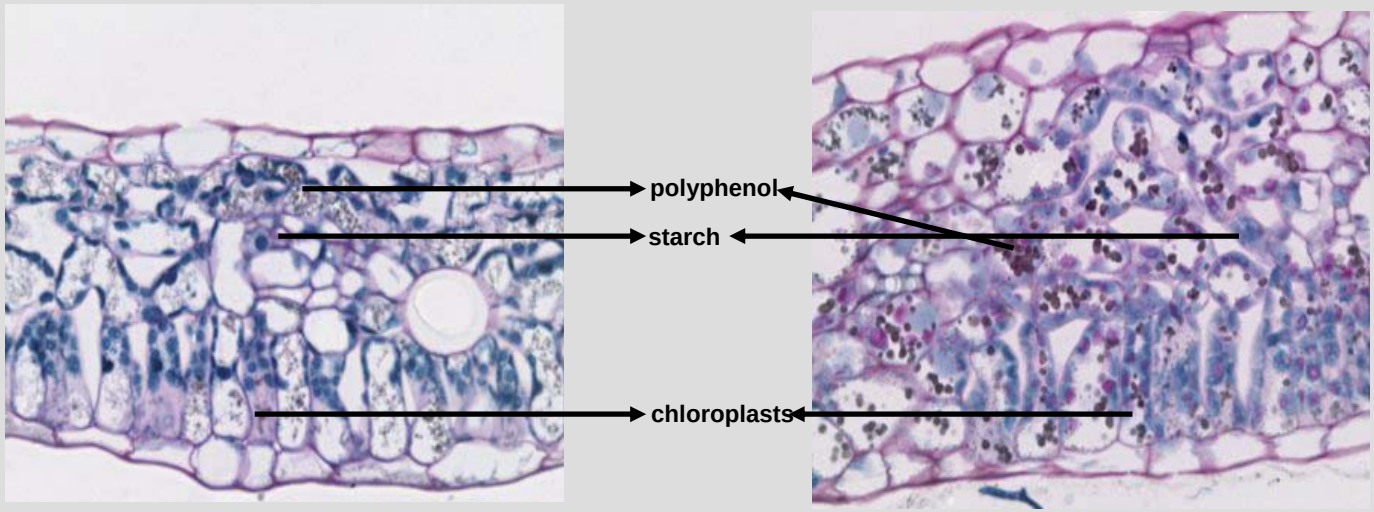
The natural defence of the healthy growing plants is strengthened. Pests and diseases attack weak and sick plants.

Plants have green coloring and less signs of aging after treatment with ***HERBAGREEN ®*** .



The good results achieved with *HERBAGREEN ®* are based on this clear and logical mode of action. .

HERBAGREEN ® - *impact on leaves*



Control vine leaf

Vine leaf treated with *HERBAGREEN ®*

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metabolic activity

HERBAGREEN ® **treatment results in different physiologic and metabolic effects:**

Chloroplasts: chloroplasts are better formed and bigger in the treated leaves resulting in a more efficient photosynthesis.

Polyphenols: a higher supply of polyphenols to the fruits has been observed by testing ripe fruits.

Proteins: Treated leaves have more proteins in their structure, which indicates a higher metabolic activity, confirmed by the chloroplasts structure. Metabolism is more active in the treated part; the presence of many cellular nucleuses indicates a high protein synthesis.

Summary:

By boosting the photosynthetic process formation of primary and secondary metabolites like starch and polyphenols is increased.

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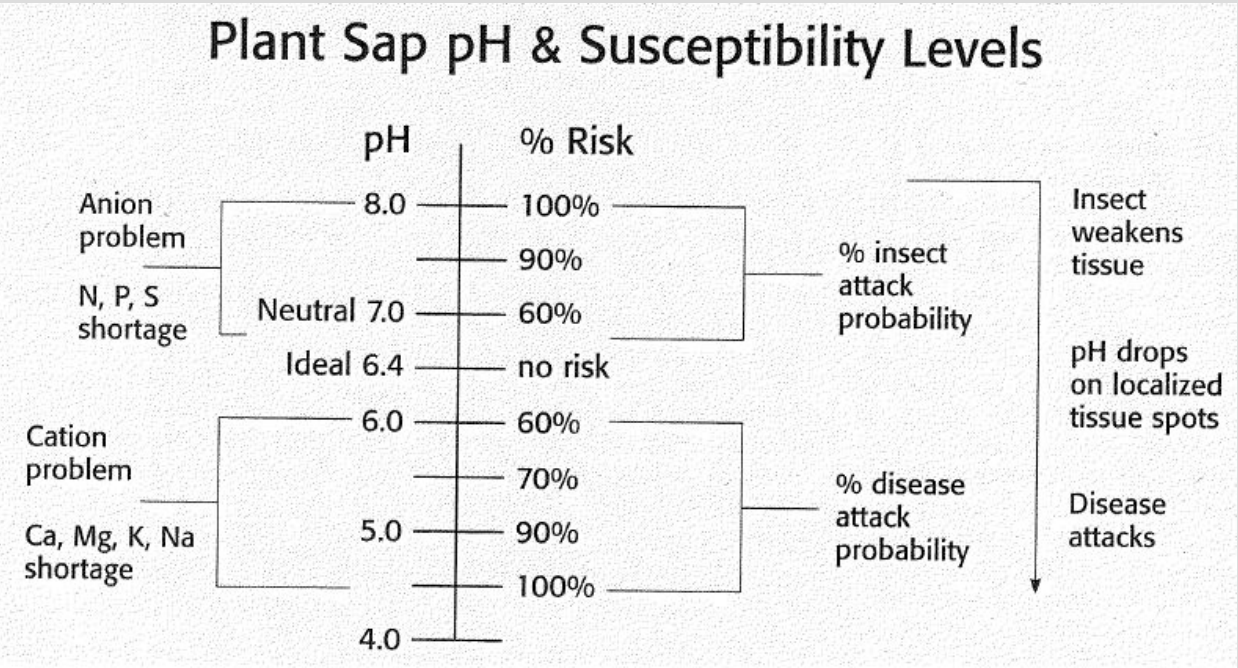

The important role the pH-value of the sap plays in the health of plants.

With *HERBAGREEN®* we target an optimal pH-value of the leaves.

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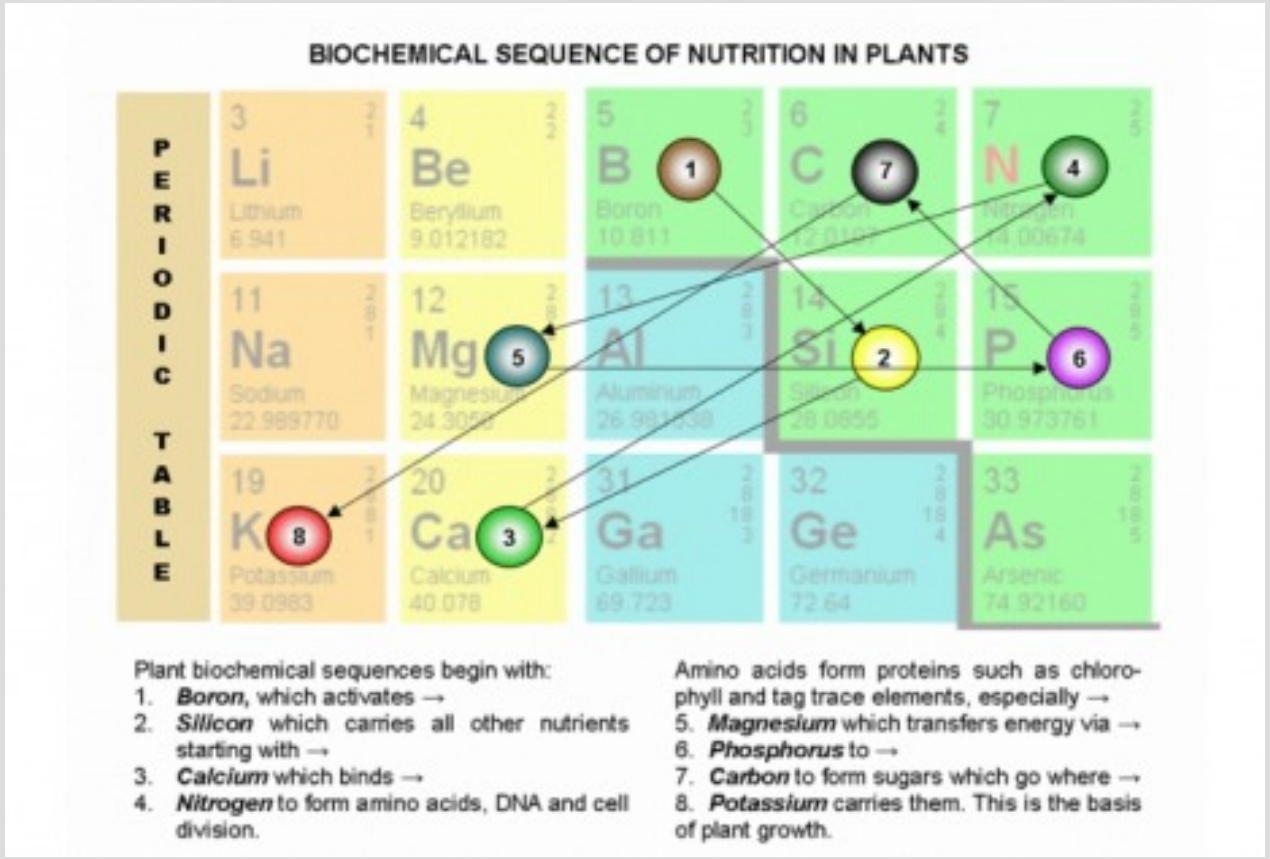
BIOCHEMICAL SEQUENCE OF NUTRITION IN PLANTS
PERIODIC TABLE
Li Lithium 6.941
Be Beryllium 9.012182
B Boron 10.811
C
N
Na Sodium 22.989770
Mg
Al
Si
P
K Potassium 39.0983
Ca Calcium 40.078
Ga Gallium 69.723
Ge Germanium 72.64
As Arsenic 74.92160
1
2
3
4
5
6
7
8
Plant biochemical sequences begin with:
1. Boron, which activates →
2. Silicon which carries all other nutrients starting with →
3. Calcium which binds →
4. Nitrogen to form amino acids, DNA and cell division.
Amino acids form proteins such as chlorophyll and tag trace elements, especially →
5. Magnesium which transfers energy via →
6. Phosphorus to →
7. Carbon to form sugars which go where →
8. Potassium carries them. This is the basis of plant growth.

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The Biochemical Sequence of Plant Nutrition
(one step has to occur before the next can happen)

1. **Boron activates Silicon**
2. ***Silicon*** **is the carrier for all other nutrients and is required in the formation of the cell membrane .**
3. ***Calcium*** **is the first to be bound to Nitrogen to form amino acids, DNA and cell division. Amino acids form proteins such as chlorophyll and tag trace elements like Magnesium.**
4. ***Magnesium*** **transfers energy via Phosphorous to Carbon to create sugars.**
5. **Sugars are transported by Potassium to wherever they are needed.**

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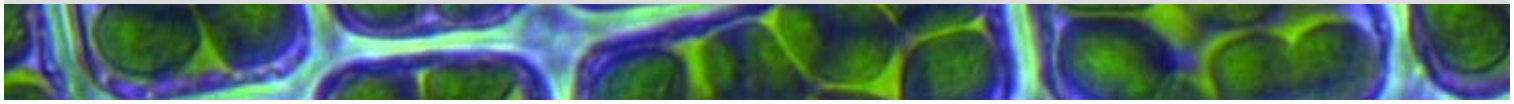
The important role of Calcium

Calcium is “the last thing you want to leave behind ” (Hugh Lovel) because of its role in nitrogen fixation and amino acid chemistry.

Calcium balances the electrical charges in protein chemistry and is particularly important in cell division (growth of plants).

HERBAGREEN ®

provides the plants with the required calcium fast and for immediate use.



HERBAGREEN ®

GENERAL RESULTS, valid for all cultures

Application of HERBAGREEN® results in:

shortening the vegetation period up to 30%
increased yield (20% to 40%) in green houses even much more

improved resistance against diseases
anti-fungal protection

reduction of problems with undesired insects

significant increase of dry matter content (BRIX) in fruits and vegetables

longer storage life of crops
improved organoleptic qualities and coloration

better taste
healthy seeds for the next crop

HERBAGREEN ®

CERTIFICATION
The natural fertilizer made of Calcite (CaMg)C03

certified for use in organic growing.

In Europe certified as an ecological product corresponding to the NFU44-001 standard for use in organic agriculture

in conformity with

CEE No. 2092/91 regulation of 24/7-91

OMRI certification in USA